Section: Energy Review

Task 11: We have established an energy baseline(s), approved objectives and energy performance improvement targets, and timeframes for their achievement

Getting It Done

- Develop an energy baseline(s) for each EnPI.
    - Record the energy baseline(s) and measure changes in energy performance against the baselines.
    - Establish the conditions under which adjustments to the baseline(s) will be made.
- Develop your organization's objectives and targets for energy performance improvement.
    - Use the Energy Objectives and Targets Worksheet to work through required considerations and document results.
    - Obtain top management's approval of the objectives and targets and communicate appropriately.

Task Overview

The energy baseline is the reference point used as the basis of comparison for determining energy performance. The baseline is established using the energy and organizational data from the energy review. It is responsibility of the management representative with support from the energy team.

The baseline facilitates comparison between where an organization's energy performance is (or will be) and where it started the energy improvements. The baseline can be for any time period that is meaningful to your organization and the performance metric being evaluated. Often a baseline is established by an organization's strategic initiatives or in response to a legal or other requirement. The baseline is established considering the data period(s) suitable for your organization's energy use and consumption. Typically, each identified EnPI will have an associated baseline.

Once the energy baseline has been determined, energy objectives and targets, with time frames for their achievement, should be established. Energy objectives are specific outcomes that your organization sets for itself to meet its energy policy commitment to improved energy performance. Energy targets are the quantified energy performance requirements set by your organization that need to be met to achieve the associated energy objectives. The energy objectives and targets, along with their related action plans (see Improvement Projects), are the driving force for continual improvement in your organization's energy performance.

At the completion of this task, you will have…

- Established a baseline(s)
- Compared EnPIs to the baseline(s)
- Recorded and maintained the baseline(s)
- Specified conditions for adjusting the baseline(s)
- Gathered and reviewed appropriate inputs
- Defined and documented energy objectives and targets
- Obtained management approval
- Communicated the energy objectives and targets

This guidance is relevant to Sections 4.4.4 and 4.4.6 of the ISO 50001:2011 standard.

Associated Resources	Short Description
Energy Objectives and Targets Worksheet	This worksheet provides a template for users to document Energy Objectives and Targets for their EnMS.
ENERGY STAR Guidelines for Energy Management	ENERGY STAR Guidelines for Energy Management guidance document.
ENERGY STAR Portfolio Manager®	EPA's online energy management and tracking tool enables you to measure and track the energy and water performance of any building over time.

Full Description

Establish baseline(s)

The baseline can be established at any level of your organization, and there may be multiple baselines. A baseline can be established for the entire facility and/or there can be baselines for individual equipment, systems, or processes. The baseline(s) is the reference(s) for comparing current energy performance to determine if performance is improving. The following inputs will help to determine the appropriate baseline(s):

- How is each EnPI used for evaluating energy performance? Is there a logical baseline for each?
- What are the historical changes to facilities, equipment, systems, processes, or organization that would change how energy performance is evaluated?
- What stakeholder interests should be considered when establishing baselines for the energy metrics?
- Are there strategic initiatives that would be measured or influenced by one or more of the established energy performance metrics? Is there a baseline associated with these strategic initiatives?

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- What are the historical periods that have reliable, consistent data for the established EnPIs?

The answers to these questions will help identify the relevant baselines for the established EnPIs.

Learn More: **Using DOE EnPI Lite**

If you are using EnPI Lite , it is recommended that your baseline year be the 12 months before your reporting period. It is also recommended that you select your reporting period such that the last month falls within the last 11 months. A benefit of refreshing your baseline every year is your model is more likely to fit your existing conditions and operations. Due to changes impacting energy use and consumption at the facility, energy models should be reviewed and refreshed periodically. Updating your baseline every year ensures this.

There may be several reasons for selecting a baseline other than the previous year (e.g., alignment with corporate baseline, alignment with financial metrics, facility changes rendering previous year unrepresentative of current conditions, etc.). If are having trouble developing a model, the EnPI Lite tool features two regression options: forecast and backcast. See the guidance in Performance Indicators (EnPIs) for more information on this. EnPI Lite will also accept baseline and reporting periods outside of the recommended windows (see above). However, older baseline periods are less likely to reflect your facility's current energy use characteristics and may not track improvements related to your 50001 Ready EnMS. If both forecast and backcast valid models are available, EnPI Lite will default to the forecast model. However, use your understanding of how relevant variables impact your energy consumption and how they are included in each model before ultimately selecting a model.

If you are using EnPI Lite to report against another baseline (e.g. a corporate baseline) or would like to leverage your DOE recognized improvements for meeting another energy performance target, you may want to consider "banking" your year-on-year energy intensity improvements. Through banking, you add successive year's energy performance improvements to each other. While this allows for maintaining multiple baselines, there is a discrepancy between the actual improvement calculated against the baseline year and the improvement calculated using banking against the same baseline year. This discrepancy will increase as you move further away from your baseline year. The table below describes the "banking" concept and illustrates the discrepancy:

Achievement period	Annual improvement calculated in EnPI Lite	Total improvement calculated against 2015	Total improvement against 2015 using "banking"
2015 – 2016	2%	2%	2%

| 2016 – 2017 | 3% | 4.9% | 5% (= 2% + 3%) |
| 2017 - 2018 | 4% | 8.7% | 9% (= 2% + 3% + 5%) |

Compare EnPIs to the baseline(s)

The EnPIs that are established to determine energy performance are compared to the baseline to measure progress on improvement. Since the EnPIs and their associated baselines are compared, they must be consistent in forms and units to provide for a valid comparison.

If the EnPI is a simple metric (e.g., consumption) or a ratio (e.g., energy intensity Btu/lb.), energy performance is measured by comparing the current EnPI against the baseline to evaluate performance outcome from implementing action plans.

Learn More: **Result of comparing EnPI to baseline**

At least four possible results representing different performance outcomes can occur when the comparison is made:

- EnPI compared to the baseline indicates improvement in energy performance;
- EnPI compared to the baseline indicates deterioration in energy performance;
- EnPI compared to the baseline indicates no change in energy performance; or
- EnPI and baseline show no discernible pattern in their relative values. (This could indicate variation in a factor assumed to be constant or the presence of variables unaccounted for in the metric.)

The baseline can also help you forecast expected or predicted energy performance metrics. The benefit of making the comparison between actual and predicted EnPI is that it shows the direction and rate of change in organizational energy performance. Since the ultimate objective of energy management is continual improvement, consistent trends in actual and predicted energy performance indicators can demonstrate and quantify the improvement.

The responsibility for EnPI and baseline analysis generally rests with the same personnel responsible for developing, testing, and determining the factors that affect the identified performance indicators. Often charts or graphs are used to report on EnPIs and energy performance metrics. EnPIs and their associated baselines are used to report energy performance to top management.

Record and maintain the baseline(s)

The baseline or baselines are recorded, maintained, and periodically reviewed to determine if adjustments are required. Calculated EnPIs and their associated baseline(s) are recorded and reviewed regularly. Updated EnPIs are incorporated into your organization's energy planning and used to help determine energy performance. Updated EnPIs include an evaluation of the relevant baselines to determine if the baseline(s) remain relevant. Maintaining the baseline(s) ensures that the evaluation of energy performance will remain relevant and meaningful as the EnMS matures.

Accurately recording and storing of EnPIs and the associated baseline(s) creates a historical registry that displays the impact of energy management practices over time. These performance data verify the success of activities such as energy-efficiency projects, energy-efficiency training, and increased energy-management awareness. It also provides a positive message for management to build support for the EnMS.

Specify conditions for adjusting the baseline(s)

Because the energy baseline serves as the basis for comparison of energy performance, it generally remains stable over time. However, adjustments to the baseline are made in the following instances:

- When the EnPIs no longer accurately reflect organizational energy use or consumption
- When there are major changes in the process, operational patterns, or energy systems
- According to a predetermined method

Baseline records are updated when the baseline(s) is updated. Maintaining the baseline(s) keeps the measures of energy performance relevant and meaningful to your organization.

Gather and review appropriate inputs

An important first step in setting energy objectives and energy targets is to get the right people together and provide them with the inputs needed to develop relevant energy objectives and targets. The management representative and the energy team are key participants in this activity, but involving other functions can be beneficial if they are not already represented on the energy team.

Learn More: **Other functions to involve in developing energy objectives and targets**

For the purpose of establishing energy objectives and targets, a recommended best practice is to supplement the energy team with:

- Individuals with energy expertise
- Personnel in specialized functions, such as accounting or finance

- Personnel familiar with operational or production equipment
- Management familiar with organizational plans and goals
- Suppliers or contractors that provide energy equipment or resources
- Customers
- Interested parties

When setting (and later, when reviewing) the energy objectives and targets, you need to take into account the significant energy uses (Data Analysis through Significant Energy Uses (SEUs)) and the prioritized energy opportunities (Improvement Opportunities) that were identified as part of your energy review, as well as the energy-related legal and other requirements that apply to your organization (Legal Requirements). This is how the information generated by the energy review becomes an input into the energy performance improvement objectives and targets your organization sets for itself.

However, you also need to ensure that the realities of your organization's business situation, operating conditions, and constraints are part of the context in which the energy objectives and targets are established. After all, the goal is to set objectives and targets that are achievable, align with your organization's strategic business plans, and result in successful energy performance improvement. These items are:

- Financial requirements
- Business and operational conditions and constraints
- Potential technological solutions
- Views of interested parties

Define and document energy objectives and targets

As specific outcomes that an organization sets to achieve its energy policy commitment to improved energy performance, energy objectives are high-level goals that are communicated throughout the organization and are the basis for setting quantifiable energy targets. Time frames for achieving the energy objectives and targets must be established. An example of an energy objective is:

"Reduce energy consumption 10 percent in five years from the 2014 baseline."

After energy objectives are determined, your organization needs to set one or more energy targets for each objective. Energy targets define the specific, measurable energy performance improvements that contribute to achieving the objective. An energy target can apply organization-wide or only to a specific activity or part of the organization. Examples of targets that could be related to the previous example of an energy objective are:

"Reduce electricity consumption 5 percent compared to a 2014 baseline by the third Quarter of 2018."

"Reduce lighting system consumption 10 percent compared to a 2014 baseline by the end of FY 2017"

Targets may be developed in conjunction with the energy objective, or additional input may be required to identify specific targets that will enable the organization to meet the objective(s). For example, you may find it necessary to closely evaluate the potential energy savings associated with a specific energy opportunity to determine an appropriate energy target. Or, alternatively, an energy target will drive the choice of which energy opportunities are implemented to achieve the energy target and energy objective.

The extent to which energy objectives and targets have been met is reported to top management through the management review process (see Management Review). Progress towards achieving the energy objectives and targets should be monitored and reviewed on an ongoing basis. Sometimes after initial implementation of the energy objectives and targets, an organization discovers that the initial data or metrics used to measure the energy target need to be revised to meet the energy objective.

Energy objectives and targets must be documented.

Learn More: **Benefits of documenting energy objectives and targets**

Documenting them benefits your organization by:

- Clarifying the objectives and targets
- Preventing misunderstanding or assumptions
- Providing structure to the process
- Supporting training
- Providing a means for accurate communication

Documentation may be in any format appropriate for your organization. The Energy Objectives and Targets Worksheet is one approach to documenting the energy objectives and targets and the required considerations. Complete a separate worksheet for each energy objective.

Obtain management approval

Top management is responsible for ensuring that energy objectives and targets are established and for providing the resources needed to achieve them. Management ensures the energy objectives and

targets are in line with overall organizational goals and strategies.

Present the objectives and targets to management for review and approval in a clear and understandable format. Sufficient information should be provided to justify the objective's or target's purpose and its relationship to the organization's business goals and energy policy commitments. Management approves the objectives and targets or provides direction for any needed changes.

The Energy Objectives and Targets Worksheet also provides a convenient way to communicate the proposed objectives and related targets to management. This helps inform management on the inputs that were considered and identifies how they will be monitored.

Communicate the energy objectives and targets

Once the energy objectives and targets have been formally documented and approved by management, they should be broadly communicated across the organization using the communication and training processes of the EnMS (see Communications and Training). At a minimum, start by communicating the objectives and targets to the energy team and to all personnel who can affect them or have a role in achieving them. While some personnel may not have direct responsibility for achieving the objectives and targets, broad awareness of your organization's improvement efforts promotes a culture of energy efficiency and supports positive energy behavior. Employees and on-site contractors will need to be aware of how they contribute to achieving the objectives and target, so ensure that this information is incorporated into your organization's EnMS Awareness Training (see Communications). Periodically update personnel on progress made towards achieving the energy objectives and targets and celebrate success when they are achieved.